

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date
12 May 2005 (12.05.2005)

PCT

(10) International Publication Number
WO 2005/041807 A1

(51) International Patent Classification⁷: A61C 13/00, 13/08, B29C 35/08, C08F 2/50, C08G 75/04

(21) International Application Number:
PCT/US2004/034968

(22) International Filing Date: 22 October 2004 (22.10.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/513,900 22 October 2003 (22.10.2003) US

(71) Applicant (for all designated States except US): THE REGENTS OF THE UNIVERSITY OF COLORADO [US/US]; 4001 Discovery Drive, Suite 390, Campus Box 588 SYS, Boulder, CO 80309-0588 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): BOWMAN, Christopher, N. [US/US]; 3212 47th Street, Boulder, CO 80301 (US). LU, Hui [CN/US]; 2980 E. Euclid Avenue, Apt. A-17, Boulder, CO 80303 (US). STANSBURY, Jeffrey, W. [US/US]; 18111 East Ida Place, Aurora, CO 80015 (US).

(74) Agent: BRUESS, Steven, C.; Merchant & Gould P.C., P.O. Box 2903, Minneapolis, MN 55402-0903 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2005/041807 A1

(54) Title: NOVEL PHOTOPOLYMERS AND USE IN DENTAL RESTORATIVE MATERIALS

(57) Abstract: Photopolymerizable polymer composites based on dimethacrylate systems have been increasingly utilized as dental restorative materials. One of the biggest drawbacks of current dental resin systems is the volume shrinkage and shrinkage induced stresses that arise during the polymerization. Other major problems include incomplete double bond conversion and insufficient wear resistance. This invention involves the development of an entirely novel approach to the photopolymerization process that utilizes thiol-ene systems as low shrinkage and ultra-low shrinkage stress dental restorative materials. Compared with the traditional dimethacrylate dental resins, these novel photopolymerizations have demonstrated a dramatically decreased volume shrinkage, extremely rapid polymerization, abilities to photopolymerize ultrathick materials and achieve much higher conversion, lack of oxygen inhibition and ultra-low shrinkage stress due to low volume shrinkage and drastically delayed gel point conversion. These polymers have thus shown outstanding suitability as dental restorative materials.